

REMARKS

Claims 1-8, 10-19, and 21-23 are pending in the present application. These claims have been rejected. It is respectfully submitted that the pending claims define allowable subject matter.

Claims 1-6, 8, 10-17, 19, and 21-23 were rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent No. 6,315,723 ("Robinson"). Claims 7 and 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Robinson in view of United States Patent No. 5,873,830 ("Hossack"). In addition to the reasons previously set forth, the Applicants respectfully traverse the rejections for the reasons set forth below.

The Applicants now turn to the rejection of claims 1-6, 8, 10-17, 19, and 21-23 under 35 U.S.C. 102(e) as being anticipated by Robinson. The Examiner noted that "Robinson et al's teaches that scanline echo signals are filtered to use only the signals that are in correct depth and spatial alignment (col. 5, lines 48-63; col. 6, lines 23-42)," and then concluded that "Robinson et al utilize complete scanlines to form the composite line." The first portion of Robinson that the Examiner cited to support this conclusion states the following:

Referring to FIG. 7, a second embodiment of an ultrasonic diagnostic imaging system constructed in accordance with the principles of the present invention is shown. An array transducer 12 of a probe 10 is controlled by a transmitter 14 to transmit ultrasonic beams with different transmit focal characteristics into a body. The transmitter also steers the beams in desired beam directions. Echoes from within the body are produced in response to each transmitted beam and are received by the elements of the array transducer 12. The echoes are coupled to a beamformer 16 where they are

appropriately delayed and combined to form coherent echo signals along each received scanline. In a conventional ultrasound system these scanline echo signals are filtered by a filter 22, detected by a detector 24 or Doppler processed by signal processor 26, then arranged into an image format by an image processor 28. The image signals are then displayed on a display 30.

Robinson at column 5, lines 48-64. However, there is nothing in this passage that leads one to conclude that “first and second weighted echoes [are combined] along said *entire* scan line to form a composite scan line in an ultrasound image,” as recited, for example, in claim 1 of the present application. At best, this portion states that the “echoes are coupled to a beamformer 16 where they are appropriately delayed and combined to form coherent echo signals along each received scanline.” *Id.* at column 5, lines 56-58. Again, however, this citation does not state that the echoes are combined along the *entire* scan line.

The second portion of Robinson that the Examiner relies on reads as follows:

Prior to being combined the echo signals of the respective beams are locationally aligned by time variable delays 52, 54 and 56 and appropriately weighted by weighting circuits comprising multipliers 42, 44, and 46, to which time variable weighting functions... are applied from coefficient stores 32, 34 and 36. The delayed and weighted r.f. echo signals from the multiple scans of the scanline are coherently combined by a summing circuit 48 to produce a composite scanline which synthesizes the effect of a dynamic transmit focus. The effect of the weighting circuits is to weight the relative contributions of the echo signals from the three beams to the composite scanline. Preferably this weighting is functionally related to the transmit aperture and the distances of each echo

signal from its respective transmit focal point and the other focal points used in the combination process. The effect of the delays is to locationally align the r.f. echo signals being combined so that possible phase cancellation resulting from the combination of locationally mismatched signal data is reduced and preferably minimized.

Id. at column 6, lines 23-42. Once again, however, there is nothing within this passage that would lead one to conclude that “first and second weighted echoes [are combined] along said *entire* scan line to form a composite scanline in an ultrasound image,” as recited, for example, in claim 1 of the present application.

Robinson later clarifies how the echoes are combined with respect to a scan line distance:

There are several aspects of the present invention which make possible such improvement. One is that two scanlines are not simply butt-fit segments or segments cross-faded at the zone boundary as in the prior art. Instead, echoes over a ***substantial portion*** of the scanlines are processed and combined. ***Preferably*** echoes are combined over ***at least half of the distance (depth) from one focal point to the next.*** The characteristic shown in FIG. 5 results from the processing and combining of echo signals over the ***full distance from focal point 72 to focal point 74.***

Id. at column 4, line 59 to column 5, line 1 (emphasis added). The system and method of Robinson combines echoes over a ***substantial portion***¹ of the scan lines. In particular, echoes are combined over ***at least half of the distance from one focal point to the next.*** The distance from one focal point to the next is not the entire distance of the scan line. Even

¹ As previously discussed, a portion, by definition, is not a whole, even if the portion is “substantial.”

if echoes were combined over the entire distance from one focal point to the next, that distance still would not be the “entire scan line.”

In fact, Robinson further emphasizes that only portions of scan lines, but not scan lines in their entirety, are used:

A preferred embodiment of the present invention, as discussed above, combines scanline *segments* which spatially overlap for an appreciable range, *generally at least half the distance between focal points and preferably for the full distance between focal points* as illustrated in FIGS. 5, 6a, and 6b.

Id. at column 8, line 63 to column 9, line 1 (emphasis added). The Applicants note that a segment is a portion of a whole. Webster’s Collegiate Dictionary, 10th Edition, defines a segment, inter alia, as “a separate piece of something... one of the constituent parts into which a body, entity, or quantity is divided or marked off by or as if by natural boundaries....”

The Applicants respectfully submit that Robinson clearly discloses that echoes over only portions, or segments of scan lines are combined. At most, echoes over *segments*, which are constituent parts of the entirety, of a scan line from focal point to focal point, are combined, as clearly stated at column 8, lines 63 to column 9, line 1. Thus, the Applicants respectfully submit that Robinson does not teach, nor suggest, “combining said first and second echoes along said entire scan line to form a composite scan line in an ultrasound image,” as recited, for example, in claim 13 of the present application; nor does Robinson teach, or suggest, “combining said first and second weight echoes along said entire scan line to form a composite scan line in an ultrasound image,” as recited, for example, in claim 1 of the present application. Thus, at least for these reasons, the claims of the present application

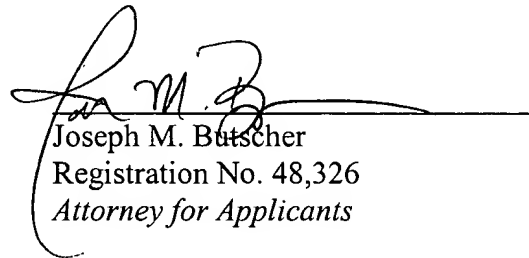
should be in condition for allowance.

In light of the above, the Applicants request reconsideration of the rejections of the pending claims of the present application and look forward to working with the Examiner to resolve any remaining issues in the application. If the Examiner has any questions or the Applicants can be of any assistance, the Examiner is invited to contact the Applicants. The Commissioner is authorized to charge any necessary fees or credit any overpayment to USPTO Account No. 07-0845.

Respectfully submitted,

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MCANDREWS, HELD & MALLOY, LTD.
500 West Madison Street, 34th Floor
Chicago, Illinois 60661
Telephone: (312) 775-8000
Facsimile: (312) 775-8100



Joseph M. Butscher
Registration No. 48,326
Attorney for Applicants